

MISCELLANEOUS.

Preliminary Report on the Expedition of the 'Talisman' in the Atlantic Ocean. By M. A. MILNE-EDWARDS.

At the public meeting of the five Academies on the 25th October, 1882, I had the honour of giving an account of the explorations of the 'Travailleur,' and I announced that this year a new scientific campaign would take place in the Atlantic. In fact, the Minister of Marine, in reply to a desire expressed by his colleague the Minister of Public Instruction and by the Academy, had given the necessary orders that a despatch-ship, the 'Talisman,' should be fitted out for that purpose.

The 'Talisman' is an excellent screw-steamer, provided with powerful sails, sufficient without the help of its machinery to give it a rapid motion. During several months, in the dockyards of the arsenal at Rochefort, it was placed in the hands of the Marine engineers, who undertook to adapt it to the service which it was to fulfil. The old hempen ropes intended to raise the dredges were replaced by a steel cable of extreme firmness and flexibility, able to support, without breaking, a weight of nearly 4500 kilogrammes, and presented to the Admiralty by the Minister of Public Instruction*. Two steam-engines secured its action: one of them set in motion the enormous reel on which it was coiled; the other, which was more powerful, drew up the dredging-apparatus. Some large nets or trawls of 2 or 3 metres across the mouth replaced with advantage the heavy dredge which we formerly employed. The soundings were made by means of an apparatus perfected by M. Thibaudier, marine engineer, and arranged in such a manner that the movements of the vessel should have no influence on the tension of the steel rope; an automatic brake arrested the unwinding directly the sounding-apparatus touched the bottom. In order to measure the temperatures of the deep strata of the water I had caused to be constructed an apparatus enabling a thermometer with a broken column of mercury to turn over at a given moment. The same movement caused the breakage of the capillary extremity of glass tubes in which a vacuum had been produced, and into which the sea-water then rushed, furnishing samples of perfect purity, which could be indefinitely preserved after hermetically sealing the tubes.

Our *confrère*, Colonel Perrier, was kind enough to lend me a Gramme machine, which furnished electricity to some Edison lamps, so placed as to illumine our apparatus, or, at need, to descend into the sea to a depth not exceeding 35 metres. At my request the command of the vessel was confided to Captain Parfait, who, the preceding year, occupied the same post on board the 'Travailleur'†.

* The weight of a metre was 344 grammes, and the price about 0 fr. 62.

† The staff was composed of M. Antoine and M. Jaquet, lieutenants, of MM. Gibory and Bourget, ensigns, of M. Vincent, doctor, and M. Huas, assistant doctor, and of M. Plas, purser.

I may here be permitted to express to the officers of the 'Talisman' all the gratitude with which their courtesy has inspired us. They interested themselves in our work with an ardour which never flagged, and if we have completely succeeded in our mission it is to them that we owe our success.

On the 30th of May the scientific commission met at Rochefort *, and on June 1st the 'Talisman' quitted port.

The expedition of 1883 may be subdivided into several distinct sections:—we had in the first place as our object to study the coast of Africa as far as the Senegal; then to explore the neighbourhood of the Cape-Verd Islands, the Canaries, and the Azores, volcanic lands which could not fail to furnish us with some interesting facts; lastly, we hoped to pay some attention to the Sargasso Sea, from the point of view of its fauna and the nature of its bed.

The depths which extend to the west of Morocco and the Sahara are of very great regularity; one no longer finds there that disturbed relief which, on the coasts of Spain, had rendered our operations so difficult. On the contrary, the slope is gradual, and by travelling further from or nearer to the land one can find, almost certainly, the depth that one expected. On these bottoms we used the dredge about 120 times, and at the end of some days we knew the bathymetric distribution of the animals of this region well enough to be able to indicate from the contents of our nets what had been the depth explored.

At 500 or 600 metres live numerous fishes, such as *Macrurus*, *Malacocephalus*, *Hoplostethus*, and *Pleuronectes*, as well as some shrimps of the genus *Pandalus* and of a new species with a rostrum pointed like a sword, species of *Peneus* and *Pasiphaë*, some small crabs (*Oxyrhynchi*, *Portunidae*, and *Ebalidae*), some rose-coloured Holothurians, some rare specimens of *Calveria*, that soft sea-urchin discovered in our seas by the naturalists of the 'Porcupine,' and known previously in the fossil state, and many sponges of great size, such as *Askonema* and *Furra*.

At a greater depth, about 1000 or 1500 metres, fishes abound †. Often they constituted the greater part of our booty. Their colours are, in general, dull, their flesh is gelatinous, their skin is indued with a thick coat of mucus; many bear phosphorescent plates, intended to light them in the darkness where they live.

The *Pandali* have given place to the new genus *Heterocarpus*, Peneidæ in which the last two pairs of legs are long and articulated like antennæ; and to enormous shrimps of a blood-red colour and

* The commission was composed of M. A. Milne-Edwards, of the Institute, president, of MM. de Folin, Vaillant, Perrier, Marion, Filhol, and Fischer, to whom had been added, as assistants, MM. Brongniart and Poirault. Detained at the last moment by his university duties, M. Marion was unable to embark.

† There are still *Macruri*, to which are to be added the following genera:—*Bathynectes*, *Coryphænoïdes*, *Malacocephalus*, *Bathygadus*, *Argyropelecus*, *Chauliodus*, *Bathypteris*, *Stomias*, *Malacosteus*, *Alepocephalus*.

with excessively long antennæ, which were not known, and which ought to be placed in the genus *Aristæus*. *Nephropses* appear at this level; these are blind Crustaceans, of a coral-colour; their geographical distribution seems to be very extended, for they have been found on the other side of the Atlantic, in the Caribbean Sea, and a very nearly allied species has been taken at a great depth in the neighbourhood of the Andaman Islands. The blind *Polycheles*, which replace in existing nature the Jurassic *Eryons*, hide themselves in the mud, and only allow their long hooked claws, destined to seize their prey in passing, to protrude.

Some other crabs occur; some Maiidæ (*Scyramathia*, *Lispognathus*); Homolides of a new species; and some species of *Lithodes*, a genus which was thought to be peculiar to the northern and southern seas. Numerous species of the group of the Galatheidæ were observed, of which several have the eyes transformed into spines. The sponges are extremely common; the greater number have a siliceous skeleton. We have taken a profusion of *Rosselle* and *Holtenie* of several species, of which the fibres, like snow-white crystal, are buried in the mud, while the sponge alone emerges; and some *Aphrocallista*, of which the solid framework assumes the most elegant forms. The *Calveria* become more numerous; Holothurians (*Laetmogone* and others) crawl on the ground in the midst of Astेरians, Ophiurans, and *Brisingæ*. Our nets often came up charged with such riches that the day did not suffice to classify them.

Passing Cape Ghir and Cape Nun, at about 120 miles from the coast, the 'Talisman,' during several days, explored a very regular bank, of which the depth is about 2000–2300 metres. It was upon this same bank that, on August 2, 1882, the 'Travailleur' captured the singular fish described by M. Vaillant under the name of *Eurypharynx pelecanoïdes*, and of which two examples have been taken this year. Our dredgings were once more of great value. Superb sponges, allied to those which have been described under the name of *Euplectella suberea*, occurred, mixed with great violet Holothurians of the genus *Bentho-dytes* and with other species of the same kind, remarkable for their dorsal appendages. A *Calveria* distinct from those of lesser depths, *Brisingæ*, corals of rare beauty (*Flabellum*, *Stephanotrochus*), a *Democrinus*, and a *Bathycrinus* not yet described, very numerous Crustaceans, nearly all new to us and belonging to the group of Galatheidæ (*Galathodes*, *Galcantha*, *Elastomonotus*), completed the invertebrate fauna. The fishes were very varied, and their study will furnish new facts of the greatest interest. Amongst the most remarkable I will mention *Melanocetus Johnsoni*, some *Bathytrochites*, a *Stomias* with phosphorescent plates, and several *Malacosteï*.

Between the Senegal and the Cape-Verd Islands our nets attained a depth of 3200 and 3655 metres, and brought up the greater part of the preceding species as well as many others (crustaceans, mollusks, zoophytes, sponges) which had not been met with elsewhere.

These last dredgings terminated the first part of our expedition,

and on the 20th July, after fifty-one days' sailing, we cast anchor in the Bay of Praia, at Santiago, in the Cape-Verd Islands.

These volcanic islands detained us some days, and while zoological, botanical, and geological excursions were made on land, the 'Talisman' investigated the irregular littoral regions in search of marine animals, and, in particular, the red coral which has been for some years the object of an active commerce on these shores. I shall not dwell upon these littoral researches any more than upon the exploration of the islet of Branco, where we studied, in their home, the great lizards (*Macroscoincus Coctei*), which seem to be confined to this isolated rock. All these details find their place in the report which I have addressed to the Ministry, and of which the publication will take place shortly.

In the depths of these seas off Cape Verd, life has an astonishing vigour. Our nets came up filled to the brim; at one cast we have taken more than 1000 fishes, belonging for the most part to the genus *Melanocephalus*, more than 1000 *Pandalii*, 500 shrimps of a new species with enormously long legs (*Nematocarcinus*), as well as many other species.

On the 30th July, the 'Talisman' started to the north-west and sailed towards the Sargasso Sea. I will not enlarge upon this part of our journey; it will be sufficient for me to say that in no part have we met with those floating meadows of which the older navigators speak. The Sargassos appeared in isolated bundles floating, in definitely oriented lines, in the direction of the winds or of the currents, and sheltering a whole pelagic population of which the colours harmonized admirably with those of the seaweeds which serve them as a refuge; the naturalists on board made a careful study of them.

The soundings of the 'Talisman' in this part of the Atlantic show in a general way that, starting from the Cape-Verd Islands, the bottom deepens regularly to about the 25th parallel, where it reaches 6267 metres, then it gradually rises again towards the Azores, and under the 35th parallel it is no longer more than 3000 metres. These results are far from agreeing with the curves indicated on the most recent bathymetric charts. The bed of the Sargasso Sea seems to be formed of a thick layer of very fine mud of a pumiceous nature, containing fragments of pumice-stone and of volcanic rocks.

It seems that there may be here, at more than a league below the surface of the water, an immense volcanic chain parallel to the coast of Africa, and of which the Cape-Verd Islands, the Canaries, Madeira, and the Azores would be the only emergent points.

The submarine fauna is poor; it is composed of a few fishes, of some Crustaceans, such as *Paguri*, lodged in colonies of *Epizoanthi*, shrimps of the genus *Nematocarcinus*, and species of *Pasiphaë*, and of a few Mollusca (*Fusus*, *Pleurotoma*, and *Leda*), which scarcely sufficed to compensate us for the time which dredgings so deep as these occupied.

It was not until about the northern limit of the Sargasso Sea,

where the bottom is raised to 3000, 2500, and 1500 metres, that our captures again became abundant; it was here that we took the giant of the family of the Schizopodes, a *Gnathophausia* of a blood-red colour, measuring almost 0·25 metre in length. A short stay of the 'Talisman' at Fayal and afterwards at St. Michael, in the Azores, enabled us to compare the still active volcanic phenomena with those which we had just studied at the summit of the Peak of Teneriffe.

The analogy of the rocks, of the gaseous products, and of the deposits of sulphur is striking, and, from what takes place at the surface of the ground, one can form an idea of the submarine convulsions which have covered the bed of the Sargasso Sea with pumice and igneous rocks.

Our voyage from the Azores to France was made under excellent conditions, and every day a dredging was made at depths of from 4000 to 5000 metres. These difficult operations, very skilfully conducted by Captain Parfait, brought to us harvests of extreme importance.

Under this crushing pressure, in a dark medium and without traces of vegetation, the animals are numerous and of a very perfect organization.

Great fishes of the genus *Macrurus*, as well as *Scopeli* and *Melanoceti*, seem not to be rare there. Some Hermit Crabs and Galatheidæ of a new form, a gigantic Nymphonid of the genus *Colossendeis*, some unknown *Ethencæ*, some Amphipodes, and some Cirripedes represent the Crustaceans. But this abyssal fauna owes its physiognomy especially to the number, variety, and size of the Holothurians which dwell there.

The sea-bottom is carpeted in all that region with a thick white mud, almost entirely formed of *Globigerinæ*, and covering pumice and fragments of rocks of different natures, of which some bear the impressions of fossils, and, among others, of Trilobites; but what surprised us most was to find, at a distance of more than 700 miles from the coast of Europe, pebbles polished and striated by ice. The distinctness of these striae does not allow us to suppose that they were transported by currents. The presence of these pebbles is probably due to the action of floating masses of ice which, at the quaternary epoch, advanced further towards the south than at the present day, and which, melting in that part of the Atlantic comprised between the Azores and France, let fall on the bottom stones which they had previously carried along torn from the bed of the glaciers.

On the 30th August we dragged our nets for the last time on the rapid declivity which unites the abysses of the ocean with the depths of the Bay of Biscay, and our captures added to the fauna of the French seas a great number of new or interesting species. It was time to return to Rochefort: our casks and jars were full, our alcohol was exhausted. This expedition has furnished us with incomparable materials for study; it remains now to set to work upon them. The Minister of Public Instruction recognizes the importance of this, and he has been kind enough to furnish me with

the means of commencing the publication of the results. Finally I intend to place before the public in a special exhibition, which will take place at the Museum about the end of the month, the collections gathered during the expeditions of the 'Travailleur' and the 'Talisman.'—*Comptes Rendus*, December 17, 1883, p. 389.

New Aphidological Discoveries. By M. LICHTENSTEIN.

Thanks to the assistance of several foreign entomologists, among whom M. Howath of Budapest and M. Kessler of Cassel occupy the first place, I have been able to ascertain absolutely the fact of the migration of the Aphides of the elm to the roots of grasses, and their return to the trunks of the trees in autumn.

Tetraneura ulmi of authors, the commonest of the Aphides of the elm, upon the leaves of which it forms little smooth, green galls the size of a large pea or a hazel-nut, lives, during its subterranean budding phase, on the roots of maize in Austria and Hungary, and here on the roots of the dog's-tooth grass (*Cynodon dactylon*). Passerini and many others had made of this subterranean Aphid a distinct species under the name of *Pemphigus Boyeri*, Pass., = *radicum*, Boyer, = *Zecæ maidis*, Löw & Duf., &c. &c. As there are very probably many species which live upon the roots of plants in summer (in my own opinion nearly all the gallicolous species have their corresponding subterranean form), the characters of these insects vary much according to authors: but the *Tetraneura ulmi* seems to me to be very well characterized and easily recognized by the fifth joint of the antennæ being as long as the third.

I have conveyed winged insects taken from the roots of the dog's-tooth grass upon a strip of brown paper, fixed round a young smooth-barked elm, with the view of giving them an artificial shelter between the paper and the bark. They did not attempt to fly away; on the contrary, they set to work at once to deposit sexual pupæ, which soon opened and furnished males and females, destitute of rostra, as in most Pemphiginæ. What is more, the next day all the winged Aphides of the roots in the neighbourhood seemed to have appointed to meet on my strip of paper, which swarmed with insects, drawn together probably by the inexplicable instinct of the lowest forms of animals.

At the same time I was able to ascertain the arrival upon the same tree of a second species, *Tetraneura rubra*, Licht., which forms small red, curled, and villous galls upon the leaves. After pulling up some hundreds of different plants I also found the subterranean habitat of this species; it is the *Panicum sanguinale*. In this species the apterous form is reddish, while it is quite white in *Tetraneura ulmi*. The winged forms have the fifth joint of the antennæ shorter than the third.

I still (10th December) find wingless Aphides alive upon the roots, which would prove that, as in the *Phylloxera*, side by side with the winged pupiferous form which gives origin to the sexual reproducers, there is, parallel with this reproduction, an uninterrupted sequence of subterranean agamic reproduction, so that, should any